GCE AS/A LEVEL

WJEC GCE AS/A Level in

BUILT ENVIRONMENT

APPROVED BY QUALIFICATIONS WALES

SAMPLE ASSESSMENT MATERIALS - UNIT 1

Teaching from 2022

For AS award from 2023
For A level award from 2024

This Qualifications Wales regulated qualification is not available to centres in England.

Contents

Candidate Name	Centre Number					Candidate Number				
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GCE AS and A LEVEL
BUILT ENVIRONMENT

UNIT 1

OUR BUILT ENVIRONMENT

SAMPLE ASSESSMENT MATERIALS

2 hours

INSTRUCTIONS FOR CANDIDATES

Answer **ALL** questions.

Write your name, centre number and candidate number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this booklet.

Use black ink or black ball-point pen.

Do not use pencil or gel pen.

Do not use correction fluid.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part question. You are advised to divide your time accordingly.

The total number of marks available is 80.

You are reminded of the need for good English and orderly, clear presentation in your answers. The quality of your written communication, including appropriate use of punctuation and grammar, will be assessed in your answer to question 9.

*Answer **all** questions.*

1. Give **two** possible advantages and **two** possible disadvantages of using engineered timber to create a structural form. [4]

Advantage over solid timber is that an engineered timber product of an equal depth can span further, making its use more flexible.

Another advantage over solid timber is that an engineered timber product is less likely to warp or distort and it will not have any natural weaknesses such as knots.

A disadvantage over solid timber is that an engineered timber product is likely to be expensive for use in standard domestic constructions.

Another disadvantage over solid timber is that an engineered timber product will have less resistance to fire because it will only cope with limited charring before failure.

2. (a) Describe **two** activities which take place during the construction stage of the life cycle of a building. [4]

On site construction work including of building of all substructures, superstructure finishes and fittings, and installation of services.

Snagging then hand over to Client followed by remedial works during defects liabiity period.

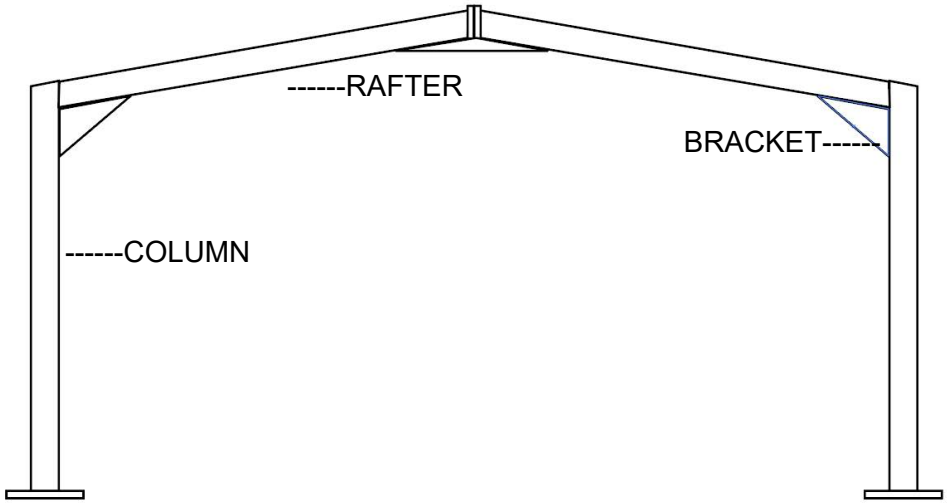
(b) Describe **two** different activities which take place during the demolition/repurposing stage of the life cycle of a building. [4]

Disconnection and making safe of mains services.

Salvaging of re-cyclable materials such as facing bricks, roofing slates and structural steel sections.

3. (a) The portal frame is commonly used for industrial building applications.

Sketch a typical portal frame and label it to show **three** features. [4]



(b) Explain why:

(i) a portal frame is particularly suitable for industrial buildings. [4]

Portal frames are suitable for industrial buildings that require large open areas for production work.

They provide clear spans without intermediate posts that allow for maximum flexibility of floor space and are fabricated off-site so reduce site time.

Their modular spacing allows for large openings such as for roller shutter doors that can be used by forklifts for deliveries.

(ii) cavity wall construction is particularly suitable for residential housing. [4]

Cavity walls are designed to prevent penetrating damp and with insulated inner skins provide a suitable environment for habitation.

Cavity walls are constructed using traditional materials that the house building industry is familiar with and employs appropriate trades. The NHBC guarantee scheme is designed to cover traditionally built houses.

4. (a) Outline the issues that a property developer would need to consider when refurbishing an existing building that was constructed within the last 50 years. [6]

This will depend on the intended use. The condition of the existing structure and fabric will be an important consideration as both could be expensive to refurbish if in a poor state.

Extent / potential for on-site parking facilities and location in relation to public transport.

Specification and quality of the exiting materials used in relation ot modern standards for performance regarding thermal insulation, fire resistance etc.

(b) Outline the additional issues that a property developer might need to consider when refurbishing a building that was constructed pre-1919. [6]

Heritage and conservation constraints if the building is of any historical value, which may add cost arising from choice and availability of materials.

Coordination problems when trying to match or extend the existing arising from differing systems for measurement.

Upgrading means of access, circulation routes and welfare facilities to accommodate wheelchair users.

5. Describe the role of a quantity surveyor, and outline how this differs if that person is employed by the client or the contractor. [6]

Provide initial cost advice and estimates regarding building proposals.

Preparing bills of quantities and other documents related to costs for tender purposes.

Advising on contracts and preparing interim valuations during the course of the work on site.

Agreeing the final contract cost.

6. Describe the main considerations when designing an opening in an external cavity wall for a door. [6]

Temporary supports required - props, needles etc and possibility matching of existing external wall finishes on completion.

Width of opening (span) and thickness of wall.

Load to be carried

Type of lintel to be used.

Details to avoid cold bridging - uninsulated routes from outside to the interior.

Details to avoid damp penetration at head and jambs.

Making good of internal finishes. Stop beads, lathing etc.

7. The supply chain is an important part of the built environment sector and is essential to the efficient running of projects.

(a) Describe **one** potential advantage and **one** potential disadvantage of a design and build contract compared to a traditional contract. [4]

Advantage: A main contractor will be appointed at an early stage in the project, will provide expert technical input and will be responsible for over-seeing the design process to ensure that the proposed building matches the clients budget and timescale

A disadvantage could be that the client will be provided with what the contractor wants to give in terms of quality and changes later in the process the affect the construction programme will be difficult to agree.

(b) Describe the potential impact on an organisation of the Modern Slavery Act 2015, with regard to the business itself and its supply chains. [6]

This Act concerns large organisations and makes them responsible for ensuring that they and their suppliers and not contravening any of the provisions regarding fair pay and reasonable working conditions.

This will become more complicated when long suppply chains are involved, particularly when suppliers may be based in different countries.

Organisations found to be in contravention of the Act will be fined and made to change their working practices - more importantly they will suffer a loss of reputation and likely long term business implications.

8. (a) Describe the techniques available when investigating subsoil at a site. [6]

Firstly it will be important to carry out desk research to find out about the findings of previous investigations, including soil types, flooding, old mine workings and underground services.

Research findings will need to be checked on site using disturbed and undisturbed testing techniques. These will involve trial pits and sampling of sub soils for further laboratory testing for containments and soil types / classification.

Tests on site will establish depths, moisture content, shear and compressive strenghts. Core drilling may be necessary to investigate soils at deeper depths if suitable sub-solis are not found in the trail pits.

(b) A developer has purchased a plot of land. It has poor load bearing capacity and has been subject to flooding. [8]

Explain in detail how the developer could improve the subsoil before undertaking any building work on this land.

Repair or install additional perimeter drainage to help remove excess ground water and reduce of future flooding.

Injection of cement based materials could help convert ground water into more solid materials.

Surface compaction of sub-soil will help if shallow foundations are to be used, or vibro-compaction using granular fills could help stabilise the ground to receive wide area rafts by reducing the volume of voids in the sub soils.

Alternatively a piled foundation system could be designed to remove concerns regarding shallow ground conditions.

9. Sustainable urban drainage systems (SuDS) are an increasingly important feature of the built environment.

Evaluate the key benefits and drawbacks of named sustainable urban drainage systems. [8]

Green roofs

Soakaways and filter strips

Rainwater harvesting

Reed beds

Ponds and basins

Swales

Wetlands

These techniques are all designed to provide some temporary storage of strom water to prevent peak flows discharging directly to public drains which may overflow causing local flooding and pollution.

The SUDS will store the stormwater and allow it to filter into the ground by natural absorbtion over time. They can be used to provide attractive features and habitats for wildlife.

Disadvantages include a high level of maintenance and cost of allocating large areas of land to SUDS.

For continuation only

MARK SCHEME

Guidance for examiners

Positive marking

It should be remembered that candidates are writing under examination conditions and credit should be given for what the candidate writes, rather than adopting the approach of penalising him/her for any omissions. It should be possible for a very good response to achieve full marks and a very poor one to achieve zero marks. Marks should not be deducted for a less than perfect answer if it satisfies the criteria of the mark scheme.

For questions that are objective or points-based, the mark scheme should be applied precisely. Marks should be awarded as indicated and no further subdivision made.

Mark schemes often list points which may be included in candidates' answers. The list is not exhaustive. *The inclusion of 'Credit any other valid response.*' (or similar instruction) within mark schemes allows for the possible variation in candidates' responses. Credit should be given according to the accuracy and relevance of candidates' answers.

Appropriate terminology is reflected in exemplar responses in mark schemes. However, unless there is a specific requirement within a question, candidates may be awarded marks where the answer is accurate but expressed in their own words.

Banded mark schemes

For band marked questions, mark schemes are in two parts, the indicative content and the assessment grid.

The indicative content suggests the range of points and issues which may be included in candidates' answers. It can be used to assess the quality of the candidate's response. As noted above, indicative content is not intended to be exhaustive and candidates do not have to include all the indicative content to reach the highest level of the mark scheme.

However, in order to reach the highest level of the mark scheme a candidate must meet the requirements of the highest mark band. Where a response is not creditworthy, that is, it contains nothing of any significance to the mark scheme, or where no response has been provided, no marks should be awarded.

Candidates' responses to questions are assessed against the relevant assessment objectives. In GCE Built Environment Unit 1, each question will address one assessment objective.

The marking of banded mark questions should always be positive. This means that, for each candidate's response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.

Examiners should first read and annotate the candidate's answer to pick out the evidence that is being assessed in that question. The mark scheme can then be applied. This is done as a two stage process.

Stage 1 – Deciding on the band

Beginning at the lowest band, examiners should look at the candidate's answer and check whether it matches the descriptors for that band. If the descriptors at the lowest band are satisfied, examiners should move up to the next band and repeat this process for each band until the descriptors match the answer.

If an answer covers different aspects of different bands within the mark scheme, a 'best fit' approach should be adopted to decide on the band and then the candidate's response should be used to decide on the mark within the band. For instance, if a response is mainly in band 2 but with a limited amount of band 3 content, the answer would be placed in band 2, but the mark awarded would be close to the top of band 2 as a result of the band 3 content.

Examiners should not seek to mark candidates down as a result of small omissions in minor areas of an answer.

Stage 2 – Deciding on the mark

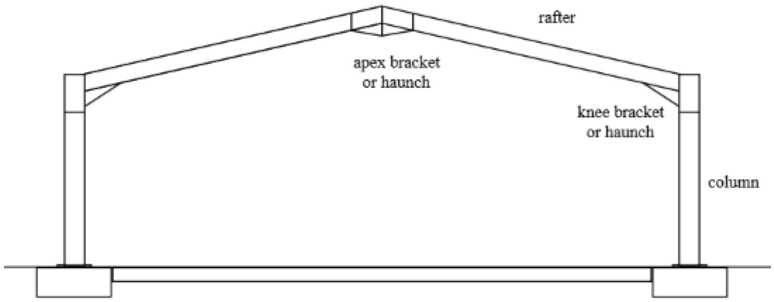
During standardising (the marking conference), detailed advice from the Principal Examiner on the qualities of each mark band will be given. Examiners will then receive examples of answers in each mark band that have been awarded a mark by the Principal Examiner. Examiners should mark the examples and compare their marks with those of the Principal Examiner.

When marking, examiners can use these examples to decide whether a candidate's response is of a superior, inferior or comparable standard to the example. Examiners are reminded of the need to revisit the answer as they apply the mark scheme in order to confirm that the band and the mark allocated is appropriate to the response provided.

Question	Answer	AO1	AO2	AO3	Total Mark
1.	*Give two possible advantages and two possible disadvantages of using engineered timber to create a structural form.*	4			4
	Award **one** mark for each possible advantage of using engineered timber (up to two), for example: • can be fabricated accurately/to a high quality off-site • engineered timber is available in large sizes • can help make the construction process quicker/more efficient • makes use of timber, which is a sustainable resource • can offer greater strength/versatility than natural wood • can be less susceptible to shrinking/warping than natural wood. Award **one** mark for each possible disadvantage of using engineered timber (up to two), for example: • specialist skills/equipment may be required for installation/assembly • transportation to site of long sections can be complex/expensive • a fire protection coating may be required • some engineered timber products are more susceptible to damage/distortion by moisture than natural wood • aesthetics can fade under ultraviolet (UV) light • may require maintenance over time. Credit any other valid response.				

Question		Answer	AO1	AO2	AO3	Total Mark
2.	(a)	*Describe two activities which take place during the construction stage of the life cycle of a building.*	4			4
		Award **one** mark for a basic description of each activity, for example: • contractors are appointed to construct the building • materials are delivered to the site • components are manufactured • the building is constructed/assembled • services are installed in the building. Award **two** marks for a more developed description of each activity, for example: • an appropriate number and range of contractors are appointed, taking account of the type and size of the building, and the timescale for completion • raw materials are ordered in sufficient quantity, delivered to the site and stored if necessary, to ensure they are readily available when required • component parts of the building are manufactured off-site (by the contractor or another business) and delivered in good time to enable construction to progress efficiently • the structure is constructed in the traditional way on-site, or assembled from prefabricated components • mechanical, electrical, water supply and drainage services are installed and commissioned. Credit any other valid response.				

Question		Answer	AO1	AO2	AO3	Total Mark
	(b)	*Describe two different activities which take place during the demolition/repurposing stage of the life cycle of a building.*	4			4
		Award **one** mark for a basic description of each activity, for example: • permission to demolish the building is obtained* • the existing structure is dismantled/demolished to make way for a new structure • refurbishment/alteration of the building is undertaken • materials are reused or recycled • the site is prepared for a new development. Award **two** marks for a more developed description of each activity, for example: • relevant permissions, such as permission to extend or demolish existing building(s)/conservation areas consent are confirmed* • the existing structure is dismantled/demolished to make way for a new structure/development and waste materials are removed from the site • refurbishment, extension, and/or alteration of the building is undertaken as required to suit the intended future use of the site • materials from the existing structure are recovered, reused and recycled as appropriate, to retain some of the original features/character of the building • the site is prepared to provide a brownfield development opportunity for the design of a new project. **do not credit if already credited in part (a), as this question requires 'different activities' to be described.* Credit any other valid response.				

Question		Answer	AO1	AO2	AO3	Total Mark
3.	(a)	*The portal frame is commonly used for industrial building applications.* *Sketch a typical portal frame and label it to show three features.*	4			4
		Award **one** mark for an appropriate sketch of a portal frame. Note there is no *quality* mark for the sketch – the mark should be awarded if it is clear that a portal frame is shown. Award **one** mark for each correctly labelled feature of the portal frame (up to three), for example:  Credit any other valid response.				

Question			Answer	AO1	AO2	AO3	Total Mark
	(b)	(i)	*Explain why:* *a portal frame is particularly suitable for industrial buildings.*		4		4
	Award **one** mark for a limited explanation of why a portal frame is particularly suitable for industrial buildings, for example: • portal frames provide a cost-effective means of construction • portal frames can cover large spaces. Award **two** marks for a basic explanation of why a portal frame is particularly suitable for industrial buildings, for example: • portal frames provide a cost-effective means of construction as the framework of the building doesn't require much material • portal frames enable wide buildings to be constructed without the need for central supports. Award **three** marks for a more developed explanation of why a portal frame is particularly suitable for industrial buildings, for example: • portal frames provide a cost-effective means of construction as the framework of the building doesn't require as much material as some other approaches and the framework can be assembled and clad quickly on-site • portal frames enable wide buildings to be constructed without the need for central supports, and any number of portal frames can be used down the length of the building, to form very long warehouses or factories. Award **four** marks for a fully developed explanation of why a portal frame is particularly suitable for industrial buildings, for example: • portal frames provide a cost-effective means of construction as the framework of the building doesn't require as much material as some other approaches, and the framework can be manufactured efficiently and accurately off-site, then assembled and clad quickly on-site • portal frames enable wide buildings to be constructed without the need for central supports, any number of portal frames can be used down the length of the building, to form very long warehouses or factories, and it is relatively straightforward to extend the building if the needs of the business change. Credit any other valid response.				

Question			Answer	AO1	AO2	AO3	Total Mark
		(ii)	*cavity wall construction is particularly suitable for residential housing.*		4		4
	Award **one** mark for a limited explanation of why cavity wall construction is particularly suitable for residential housing, for example: • cavity walls provide good insulation for the house • cavity walls help prevent dampness in the house. Award **two** marks for a basic explanation of why cavity wall construction is particularly suitable for residential housing, for example: • cavity walls provide good thermal insulation, an important property for a house as it can help reduce heating bills/energy use and make the house more comfortable • cavity walls help prevent dampness in the house because the cavity acts as a barrier between the (wet) outside wall and the inner wall, improving comfort. Award **three** marks for a more developed explanation of why cavity wall construction is particularly suitable for residential housing, for example: • cavity walls provide good thermal insulation, an important property for a house as it can help reduce heating bills/energy use in cold weather and make the house more comfortable in hot and cold weather. They also act as good sound insulators, further improving occupants' comfort • cavity walls help prevent dampness in the house because the cavity acts as a barrier between the (wet) outside wall and the inner wall, improving occupants' comfort, health and well-being. They are also more cost-efficient to build than solid walls. Award **four** marks for a fully developed explanation of why cavity wall construction is particularly suitable for residential housing, for example: • cavity walls provide good thermal insulation, an important property for a house as it can help reduce heating bills/energy use in cold weather and make the house more comfortable in hot and cold weather. They also provide an opportunity to place insulation material in the cavity, further improving thermal performance, and they act as good sound insulators, further improving occupants' comfort • cavity walls help prevent dampness in the house because the cavity acts as a barrier between the (wet) outside wall and the inner wall, improving occupants' comfort, health and well-being. They are also more cost-efficient to build than solid walls and place less weight on the foundations of the building. Credit any other valid response.				

Question		Answer	AO1	AO2	AO3	Total Mark
4.	(a)	*Outline the issues that a property developer would need to consider when refurbishing an existing building that was constructed within the last 50 years.*	6			6
		Answers may refer to the following issues that should be considered when refurbishing a building that was constructed within the last 50 years: • additional space that may be required for upgrading existing technologies • the need to secure Building Regulations approval and/or Planning Permission for significant work / extension • the need to conduct a survey for any components in the building which contain asbestos, and the safe removal of the material if required • structural work required for increased loads, for example if load-bearing walls are removed or openings are increased in size • phasing of works, by floor or area, so that the refurbishment can be undertaken as efficiently as possible • compatibility between the new and existing structures • weatherproofing between new and existing structures • matching the colour and texture of existing façade materials. Credit any other valid response.				

Band	AO1
3	**5-6 marks** A very good outline which shows: • thorough knowledge and understanding of potential issues to be considered when refurbishing a building constructed within the last 50 years • a confident grasp of relevant concepts related to the refurbishment of the built environment.
2	**3-4 marks** A good outline which shows: • generally secure knowledge and understanding of potential issues to be considered when refurbishing a building constructed within the last 50 years • generally secure grasp of relevant concepts related to the refurbishment of the built environment.
1	**1-2 marks** A basic outline which shows: • some knowledge and understanding of potential issues to be considered when refurbishing a building constructed within the last 50 years • some grasp of relevant concepts related to the refurbishment of the built environment.
	0 marks Response not creditworthy or not attempted.

Question	Answer	AO1	AO2	AO3	Total Mark
(b)	*Outline the additional issues that a property developer might need to consider when refurbishing a building that was constructed pre-1919.*	6			6
	Answers may refer to the following issues that should be considered when refurbishing a building that was constructed pre-1919: • coordination of metric to imperial dimensions throughout the property • the need to obtain Listed Building Consent if the refurbishment is of a listed building • matching materials like for like as far as possible • any planning constraints which impact on the refurbishment or use of the property • the likelihood of requiring a greater depth of foundations on any new structure in comparison with the existing foundations • matching floor levels between the original and any new parts of the building • the potential need for an expansion and contraction joint between the existing and new structures. *Do not credit a response if it has already been given credit in part (a), as this question requires ''additional issues' to be outlined.* Credit any other valid response.				

Band	AO1
3	**5-6 marks** A very good outline which shows: • thorough knowledge and understanding of potential issues to be considered when refurbishing a building constructed pre-1919 • a confident grasp of relevant concepts related to the refurbishment of traditional buildings.
2	**3-4 marks** A good outline which shows: • generally secure knowledge and understanding of potential issues to be considered when refurbishing a building constructed pre-1919 • generally secure grasp of relevant concepts related to the refurbishment of traditional buildings.
1	**1-2 marks** A basic outline which shows: • some knowledge and understanding of potential issues to be considered when refurbishing a building constructed pre-1919 • some grasp of relevant concepts related to the refurbishment of traditional buildings.
	0 marks Response not creditworthy or not attempted.

Question	Answer	AO1	AO2	AO3	Total Mark
5.	*Describe the role of a quantity surveyor, and outline how this differs if that person is employed by the client or the contractor.*	6			6
	Answers may refer to the following aspects of the role of a quantity surveyor: • provides expert advice on construction costs • ensures that projects are affordable and provide good value for money • considers different options and their impact on overall costs • ensures costs remain under control as a project progresses. The description should outline how these differ depending on whether the client or contractor is the employer. When working for a client: • the QS acts as a consultant and evaluates the client's needs and provides expert advice on what needs to be done • the QS aims to control costs on a project by considering the work required, (labour, materials, plant required), and implications of design decisions to ensure good value for money. When working for a contractor: • the QS performs the work and is involved in day to day running of projects with a focus on the work undertaken by the contractor, ensuring it stays within budget • the QS role includes the development of sub-contracts, forecasting of costs and cash flow. Credit any other valid response.				

Band	AO1
3	**5-6 marks** A very good description which shows: • thorough knowledge and understanding of the role of a quantity surveyor • a confident grasp of how the role differs if the quantity surveyor is employed by the client or the contractor.
2	**3-4 marks** A good description which shows: • generally secure knowledge and understanding of the role of a quantity surveyor • a generally secure grasp of how the role differs if the quantity surveyor is employed by the client or the contractor.
1	**1-2 marks** A basic description which shows: • some knowledge and understanding of the role of a quantity surveyor • some grasp of how the role differs if the quantity surveyor is employed by the client or the contractor.
	0 marks Response not creditworthy or not attempted.

Question	Answer	AO1	AO2	AO3	Total Mark
6.	*Describe the main considerations when designing an opening in an external cavity wall for a door.*	6			6

	Answers may refer to the following points which should be considered when designing an opening in an external cavity wall for a door:
	• installation of a lintel to support the wall/brickwork above the doorway
	• insulation of the lintel to prevent 'cold bridging'/cold spots/condensation
	• the need for:
	  • a cavity tray so that water drains out above the opening
	  • a stop end at each end of the lintel to prevent water entering the cavity
	  • weep vents/holes over the lintel to allow water to drain out
	• insertion of insulated cavity closers to prevent water entering the cavity/damp/condensation/heat loss
	• completion of internal finishes.
	
	Credit any other valid response.				

Band	AO1
3	**5-6 marks** A very good description which shows: • thorough knowledge and understanding of the main considerations when designing an opening in an external cavity wall for a door • a confident grasp of the purpose of the components used.
2	**3-4 marks** A good description which shows: • generally secure knowledge and understanding of the main considerations when designing an opening in an external cavity wall for a door • a generally secure grasp of the purpose of the components used.
1	**1-2 marks** A basic description which shows: • some knowledge and understanding of the main considerations when designing an opening in an external cavity wall for a door • some grasp of the purpose of the components used.
	0 marks Response not creditworthy or not attempted.

Question		Answer	AO1	AO2	AO3	Total Mark
7.		*The supply chain is an important part of the built environment sector and is essential to the efficient running of projects.*				
	(a)	*Describe one potential advantage and one potential disadvantage of a design and build contract compared to a traditional contract.*	4			4
		Award **one** mark for a basic description of a potential advantage of a design and build contract, for example: • the cost of the project is known from an early stage • this type of contract requires less input and expertise from the client • there is a single point of contact for the whole project. Award **two** marks for a more developed description of a potential advantage of a design and build contract, for example: • the overall cost of the project is known from an early stage as there is only one company to hire and the design is agreed at the start • this type of contract requires less management, input and expertise from the client as the contractor has responsibility for all aspects of the project • there is a single point of contact for the project, so the client doesn't have to deal with different companies at different stages of the project. Award **one** mark for a basic description of a potential disadvantage of a design and build contract, for example: • there is a blurring of the designer's and contractor's perspectives • the client has less control over the design/specification of the building • it relies on the contractor being capable of dealing with the design and construction of the project rather than one aspect of the work. Award **two** marks for a more developed description of a potential disadvantage of a design and build contract, for example: • there is a blurring of the designer's and contractor's perspectives, so the design work may be biased towards what the contractor prefers rather than what the client would like • the client has less control over the design/specification of the building as the contractor takes control of this, and any deviation may result in higher costs • it relies on the contractor being capable of dealing with the design and construction of the project rather than specialising in one aspect of the work, and this may not be ideal, particularly for more complex designs. Credit any other valid response.				

Question		Answer	AO1	AO2	AO3	Total Mark
	(b)	*Describe the potential impact on an organisation of the Modern Slavery Act 2015, with regard to the business itself and its supply chains.*	6			6
		Answers may refer to the following issues that could potentially impact on the business and its supply chains: • the Modern Slavery Act 2015 affects large companies (i.e. with global revenues of £36m or more) who operate in the UK • since 2016, those companies have to report on their efforts to ensure there is no slavery, forced labour or trafficking in their business or supply chains • those companies have to produce an annual modern slavery statement • the statement must be approved by the board of directors/signed by a director • large companies impacted by the Modern Slavery Act are likely to require their suppliers/sub-contractors to check their own suppliers sub/contractors to ensure modern slavery is not taking place • this means that even small companies in the supply chain are impacted by the Act as they need to consider their practices and relationships with their suppliers. Credit any other valid response.				

Band	AO1
3	**5-6 marks** A very good description which shows: • thorough knowledge and understanding of the main requirements of the Modern Slavery Act 2015 • a confident grasp of how the Act impacts on organisations and supply chains.
2	**3-4 marks** A good description which shows: • generally secure knowledge and understanding of the main requirements of the Modern Slavery Act 2015 • a generally secure grasp of how the Act impacts on organisations and supply chains.
1	**1-2 marks** A basic description which shows: • some knowledge and understanding of the main requirements of the Modern Slavery Act 2015 • some grasp of how the Act impacts on organisations and/or supply chains.
	0 marks Response not creditworthy or not attempted.

Question		Answer	AO1	AO2	AO3	Total Mark
8.	(a)	*Describe the techniques available when investigating subsoil at a site.*	6			6

		Answers may refer to the following techniques for investigating subsoil:
		• excavation of trial (test) pits by hand or machine (excavator) for relatively shallow investigations, to:
		  • enable visual inspection and collection of large samples of soil
		  • test for contamination
		• borehole drilling, for deeper investigations
		• insitu sampling, conducted on the soil at the site:
		  • resulting in minimal disturbance of the soil
		  • to test the density/bearing capacity/shear strength of the soil
		  • to determine groundwater pressure and moisture content
		• insitu tests include:
		  • standard penetration test (density)
		  • vane test (shear)
		  • plate bearing test (bearing capacity).
		
		Credit any other valid response.				

Band	AO1
3	**5-6 marks** A very good description which shows: • thorough knowledge and understanding of the techniques available when investigating subsoil at a site • a confident grasp of the use of soil testing techniques.
2	**3-4 marks** A good description which shows: • generally secure knowledge and understanding of some of the techniques available when investigating subsoil at a site • a generally secure grasp of the use of soil testing techniques.
1	**1-2 marks** A basic description which shows: • some knowledge and understanding of the techniques available when investigating subsoil at a site • some grasp of the use of soil testing techniques.
	0 marks Response not creditworthy or not attempted.

Question		Answer	AO1	AO2	AO3	Total Mark
	(b)	*A developer has purchased a plot of land. It has poor load bearing capacity and has been subject to flooding.* *Explain in detail how the developer could improve the subsoil before undertaking any building work on this land.*		8		8
		Answers may refer to the following ways in which the subsoil could have its load bearing capacity and drainage improved: • vibro compaction/flotation, using a depth vibrator to penetrate the soil, backfilling as necessary to compact and increase the density of the subsoil, and increase its load bearing capacity • dynamic weight compaction, by dropping a heavy weight on the soil, to achieve similar results • grouting, by injecting a water/sand/cement mix to make the soil more dense • chemical stabilisation, using cement or lime as binders • soil mixing techniques, by mechanically mixing with a cement or lime binder • improving drainage, using gravel, sand or synthetic materials, or systems of pipes, to remove excess water from the soil. Credit any other valid response.				

Band	AO2
4	**7-8 marks** An excellent explanation which shows: • thorough knowledge and understanding of how the developer could improve the load bearing capacity and drainage of the subsoil in the given context • a confident grasp of key concepts of soil improvement and stabilisation.
3	**5-6 marks** A good explanation which shows: • generally secure knowledge and understanding of how the developer could improve the load bearing capacity and drainage of the subsoil in the given context • a generally secure grasp of key concepts of soil improvement and stabilisation.
2	**3-4 marks** A basic explanation which shows: • some knowledge and understanding of how the developer could improve the load bearing capacity and/or drainage of the subsoil in the given context • some grasp of key concepts of soil improvement and stabilisation.
1	**1-2 marks** A limited explanation which shows: • little knowledge and understanding of how the developer could improve the load bearing capacity or drainage of the subsoil in the given context • little grasp of key concepts of soil improvement and stabilisation.
	0 marks Response not creditworthy or not attempted.

Question	Answer	AO1	AO2	AO3	Total Mark
9.	*Sustainable urban drainage systems (SuDS) are an increasingly important feature of the built environment.* *Evaluate the key benefits and drawbacks of named sustainable urban drainage systems.*			8	8
	Answers may refer to the benefits and drawbacks of the following forms of SuDS: • soakaway technology • swales • drainage ponds and basins • reed bed technology • filter strips and drains • wetland areas • rainwater harvesting • green roof technology. *Benefits include:* • SuDS are designed to efficiently manage the drainage of surface water in urban environments • SuDS can remove or reduce the need for traditional, piped drainage systems • SuDS help drainage systems cope with surface water runoff which has grown as more of the landscape has been replaced/covered with hard surfaces which do not allow water to pass through • SuDS help manage peak flows of water into drainage systems which otherwise might not be able to cope, leading to flooding • SuDS aim to deal with surface water runoff locally rather than discharge it quickly into piped drainage or waterways • SuDS can improve the quality of life in urban environments by introducing green areas, making them more visually attractive and providing recreation facilities • SuDS can provide habitats for wildlife and reduce pollution/improve water quality. *Drawbacks include:* • constructing SuDS may be expensive • introducing ponds and wetlands in an urban environment may bring an increased risk of accidents • SuDS can require more maintenance than other drainage systems • SuDS may require the use of large areas to be effective. Credit any other valid response.				

Band	AO3
4	**7-8 marks** An excellent evaluation which shows: • perceptive and informed judgements about the key benefits and drawbacks of named sustainable urban drainage systems • confident and detailed engagement with the concept of SuDS and their potential benefits and drawbacks. • Writing is very well structured and organised, using accurate grammar, punctuation and spelling. • A range of specialist terminology is used with accuracy.
3	**5-6 marks** A good evaluation which shows: • reasoned judgements about the key benefits and drawbacks of named sustainable urban drainage systems • thorough engagement with the concept of SuDS and their potential benefits and drawbacks. • Writing is generally well structured and organised, using mainly accurate grammar, punctuation and spelling. • Specialist terminology is used with accuracy.
2	**3-4 marks** A basic evaluation which shows: • generally valid judgements about some benefits and/or drawbacks of named sustainable urban drainage systems • straightforward engagement with the concept of SuDS and their potential benefits and/or drawbacks. • Writing shows some evidence of structure though some errors in grammar, punctuation and spelling affect meaning. • Basic use of specialist terminology.
1	**1-2 marks** A limited evaluation which shows: • little evidence of judgements about the benefits or drawbacks of sustainable urban drainage systems • little engagement with the concept of SuDS and their potential benefits or drawbacks. • Some errors in grammar, punctuation and spelling, which affect clarity of communication. • Limited use of specialist terminology.
	0 marks Response not creditworthy or not attempted.

Mapping of questions to specification content and assessment objectives

Question			Specification content (main focus)											Mark allocation			
			Section										Part	Total Marks	AO1 Marks	AO2 Marks	AO3 Marks
			2.1.1	2.1.2	2.1.3	2.1.4	2.1.5	2.1.6	2.1.7	2.1.8	2.1.9	2.1.10					
1							4						(b)	**4**	4		
2	(a)		4										(a)	**4**	4		
	(b)		4										(a)	**4**	4		
3	(a)			4									(a)(b)	**4**	4		
	(b)	(i)		4									(c)	**4**		4	
		(ii)		4									(c)	**4**		4	
4	(a)										6		(a)(b)	**6**	6		
	(b)										6		(b)(c)	**6**	6		
5					6								(e)	**6**	6		
6									6				(f)	**6**	6		
7	(a)					4							(c)	**4**	4		
	(b)					6							(d)	**6**	6		
8	(a)							6					(a)	**6**	6		
	(b)							8					(c)	**8**		8	
9												8	(b)	**8**			8
Total marks			8	12	6	10	4	14	6	0	12	8		**80**	**56**	**16**	**8**